Waterfall and Agile – dramatic opposites or close kin???

March 17, 2009

James H. Foreman, PMP
843-566-2067

www.esi-intl.com

STAY IN TOUCH WITH YOUR ENVIRONMENT!!!

What we'll cover…

- **Waterfall and Agile Software engineering – the technical view**
- **Project Management – the underpinning**
- **Reconciling the differences**

building talent, **driving** results   3

Introduction & Caveats

- **Change is hard**
- **There is no "Silver Bullet"**
- **There are no perfect People, Processes, or Tools**
- **Corporate cultures are full of "Organizational Inhibitors"**
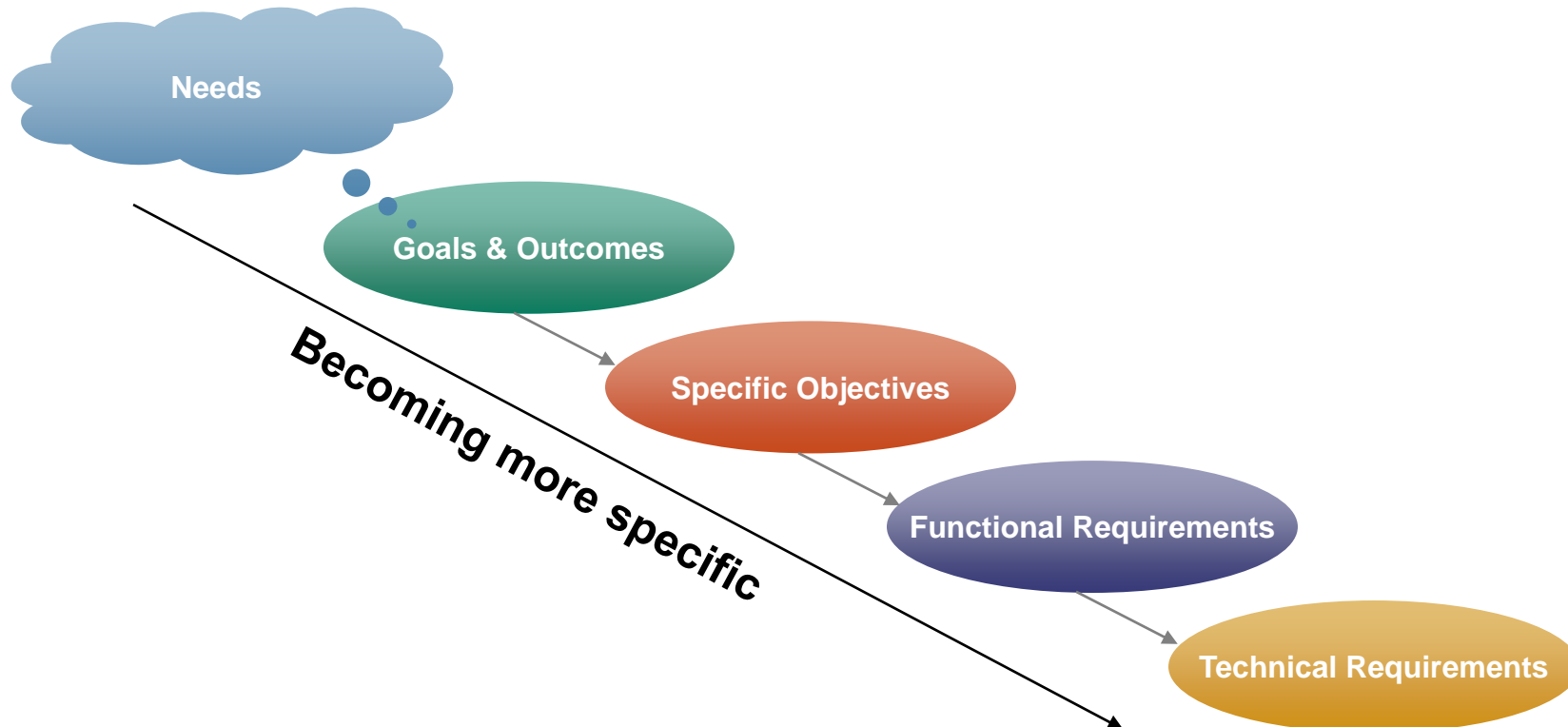
Borders and Fences

- **Hardware Architecture**
- **Software Architecture**
- **Data Architecture**
- **The Clock**
- **The Wallet**
- **Customer/User needs, wants and perceptions**

building talent, **driving** results
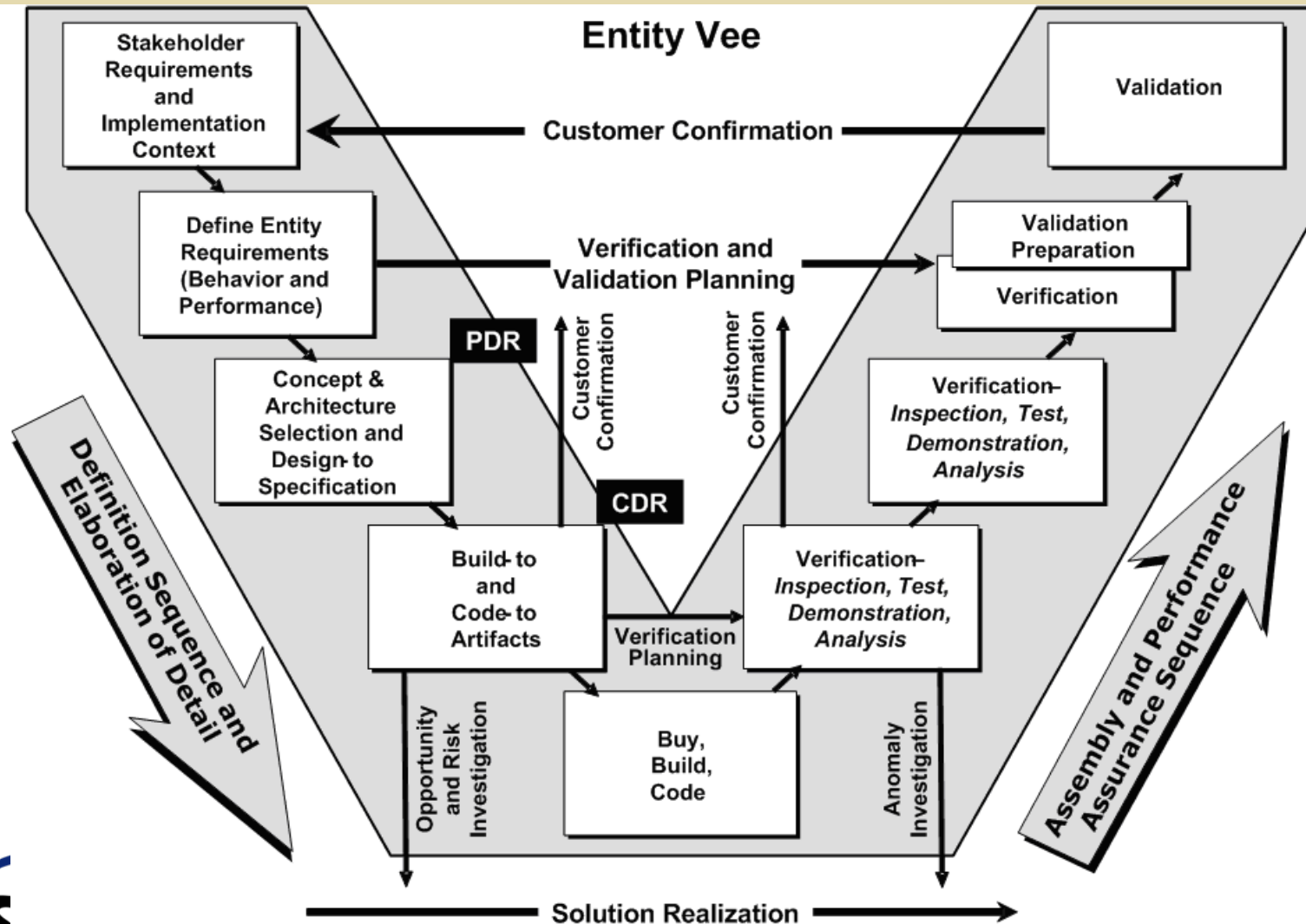
Projects Originate to Meet Needs

- **Product obsolescence**
- **Competitive forces**
- **Client requirements**
- **Employee suggestions**
- **Watercooler discussions**
- **Other stakeholder requirements**

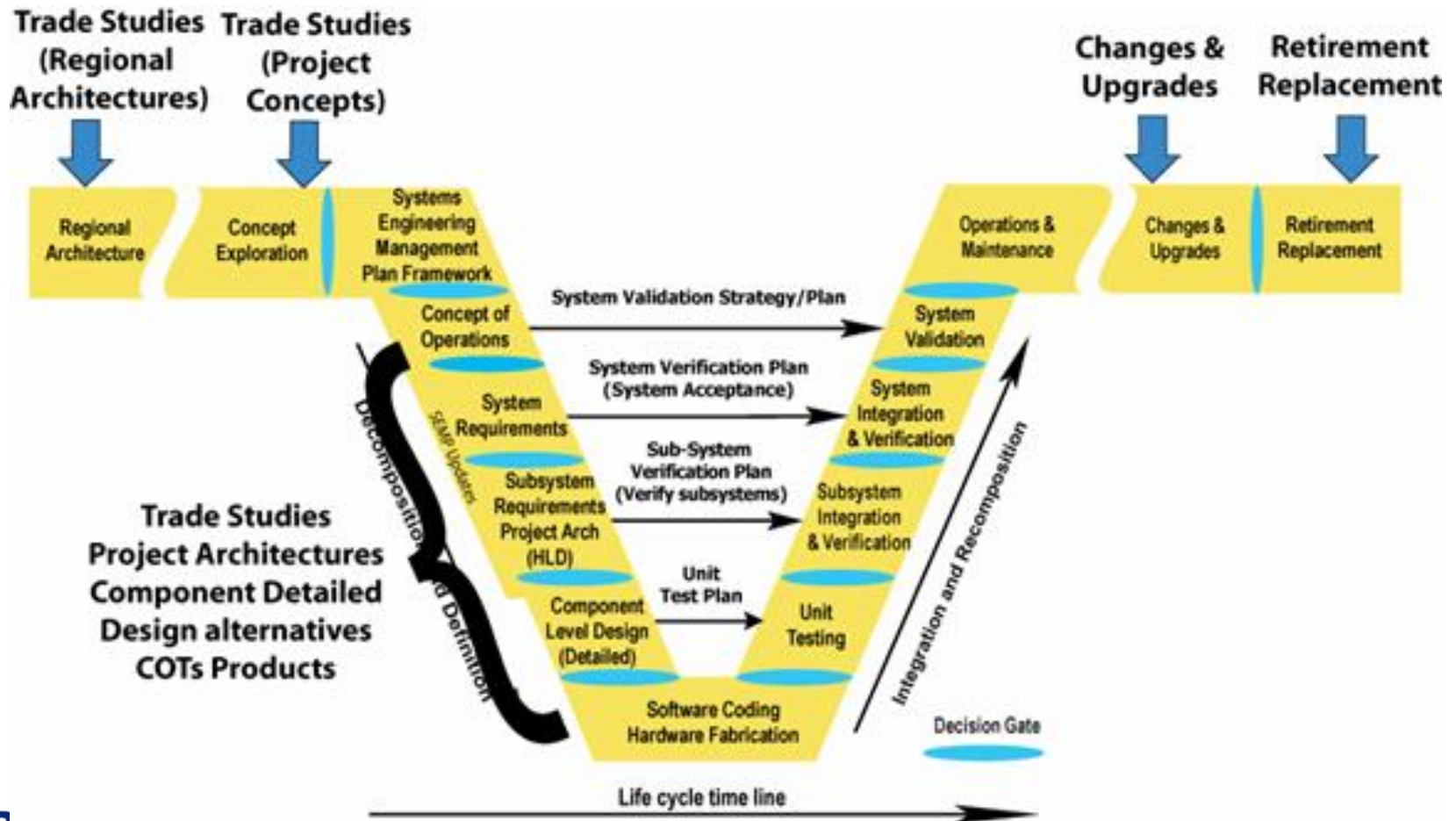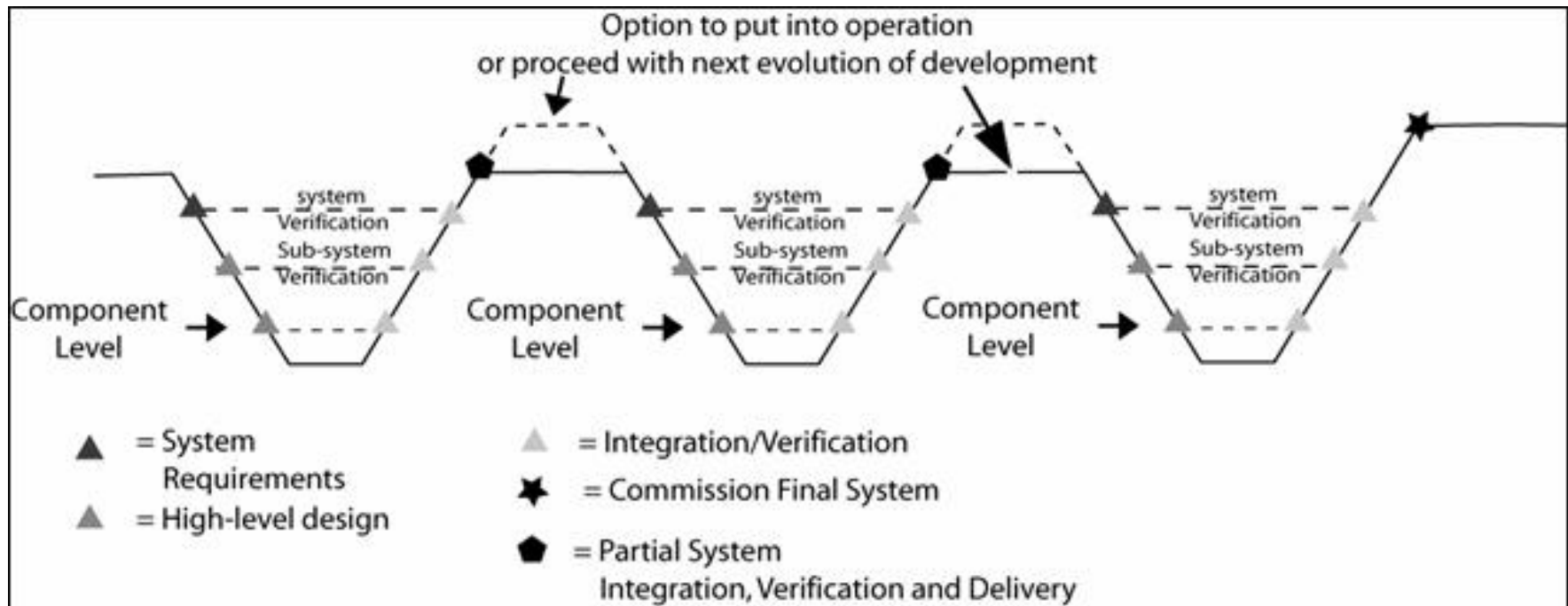# The Right Start – A Classic View

Needs

Goals & Outcomes

Specific Objectives

Functional Requirements

Technical Requirements

Becoming more specific

building talent, **driving** results

ESI INTERNATIONAL an *informa* business

Classic "V" Model

Entity Vee

- Stakeholder Requirements and Implementation Context
- Customer Confirmation
- Validation
- Define Entity Requirements (Behavior and Performance)
- Verification and Validation Planning
- Validation Preparation
- Verification
- PDR
- Concept & Architecture Selection and Design-to Specification
- Customer Confirmation
- Customer Confirmation
- Verification– Inspection, Test, Demonstration, Analysis
- CDR
- Build-to and Code-to Artifacts
- Verification Planning
- Verification– Inspection, Test, Demonstration, Analysis
- Definition Sequence and Elaboration of Detail
- Opportunity and Risk Investigation
- Buy, Build, Code
- Anomaly Investigation
- Assembly and Performance Assurance Sequence
- Solution Realization

building talent, **driving** results   8

Other "V" Models

Trade Studies (Regional Architectures)

Trade Studies (Project Concepts)

Changes & Upgrades

Retirement Replacement

Regional Architecture

Concept Exploration

Systems Engineering Management Plan Framework

Concept of Operations

System Validation Strategy/Plan

System Validation

System Requirements

System Verification Plan (System Acceptance)

System Integration & Verification

Subsystem Requirements Project Arch (HLD)

Sub-System Verification Plan (Verify subsystems)

Subsystem Integration & Verification

Component Level Design (Detailed)

Unit Test Plan

Unit Testing

Software Coding Hardware Fabrication

Operations & Maintenance

Changes & Upgrades

Retirement Replacement

Trade Studies
Project Architectures
Component Detailed
Design alternatives
COTs Products

Decomposition and Definition

SEMP Updates

Integration and Recomposition

Decision Gate

Life cycle time line

ESI INTERNATIONAL an **informa** business

Other "V" Models

Option to put into operation or proceed with next evolution of development

Component Level → system Verification / Sub-system Verification

Component Level → system Verification / Sub-system Verification

Component Level → system Verification / Sub-system Verification

▲ = System Requirements
▲ = High-level design

▲ = Integration/Verification
✶ = Commission Final System
⬟ = Partial System Integration, Verification and Delivery

building talent, **driving** results

ESI INTERNATIONAL
an *informa* business

Waterfall Advantages

- **Predictability and easier stakeholder management**
- **No 'surprises'**

building talent, **driving** results

Waterfall Disadvantages

- **May be too slow**
- **May preclude use of imagination and inspiration**

building talent, **driving** results

Project Life Cycle – Management View

I Initiation	P Planning	I Implementation	C Closeout
Key Activities	**Key Activities**	**Key Activities**	**Key Activities**
▪ Scope ▪ Triple Constraints ▪ Stakeholders ▪ Project Charter ▪ Project Requirements Document	▪ WBS ▪ Estimating ▪ Cost ▪ Schedule ▪ Resources ▪ Communication ▪ Risk	▪ Monitoring ▪ Control ▪ Change Management	▪ Scope Verification ▪ Customer Satisfaction ▪ Admin Closeout ▪ Public Relations

- **Balancing the three "sides" while managing the project**
- **Combining art and science**
- **Ongoing effort to define, refine, and re-refine project**

Cost

Time

The Business Case

Scope

Project Charter

- A project charter is a—
  - Formal recognition of the project
  - Reference of authority for the future of the project
  - Summary of project goals and objectives
  - Written agreement between senior management, the project manager, and the functional managers
  - Preliminary delineation of roles and responsibilities

Project Requirements Document (PRD) – Typical Content

- Background and summary
- Project mission and objectives
- Project phases and deliverables
- Key milestones and deliverables
- Assumptions
- Inherent risks

- Critical resource requirements
- Constraints
- Inter-related projects
- Acceptance conditions or criteria
- Reviews and approvals

Now the requirements are detailed…

building talent, **driving** results

Work Breakdown Structure (WBS)

- "A deliverable-oriented grouping of project elements that organizes and defines the total work *scope* of the project. Each descending level represents an increasingly detailed definition of the project work."

  - Planning and budgeting
  - Funding
  - Estimating
  - Scheduling
  - Performance measurement
  - Configuration management
  - Integrated logistic support
  - Test and performance evaluation

Translating the WBS into the Project Plan

- The WBS identifies the work to be done
- Developing the project plan requires that work be quantified
- Quantify work by estimating expected—
  - **Duration**
  - **Cost**
  - **Resources**
- Estimating is a deliberate process
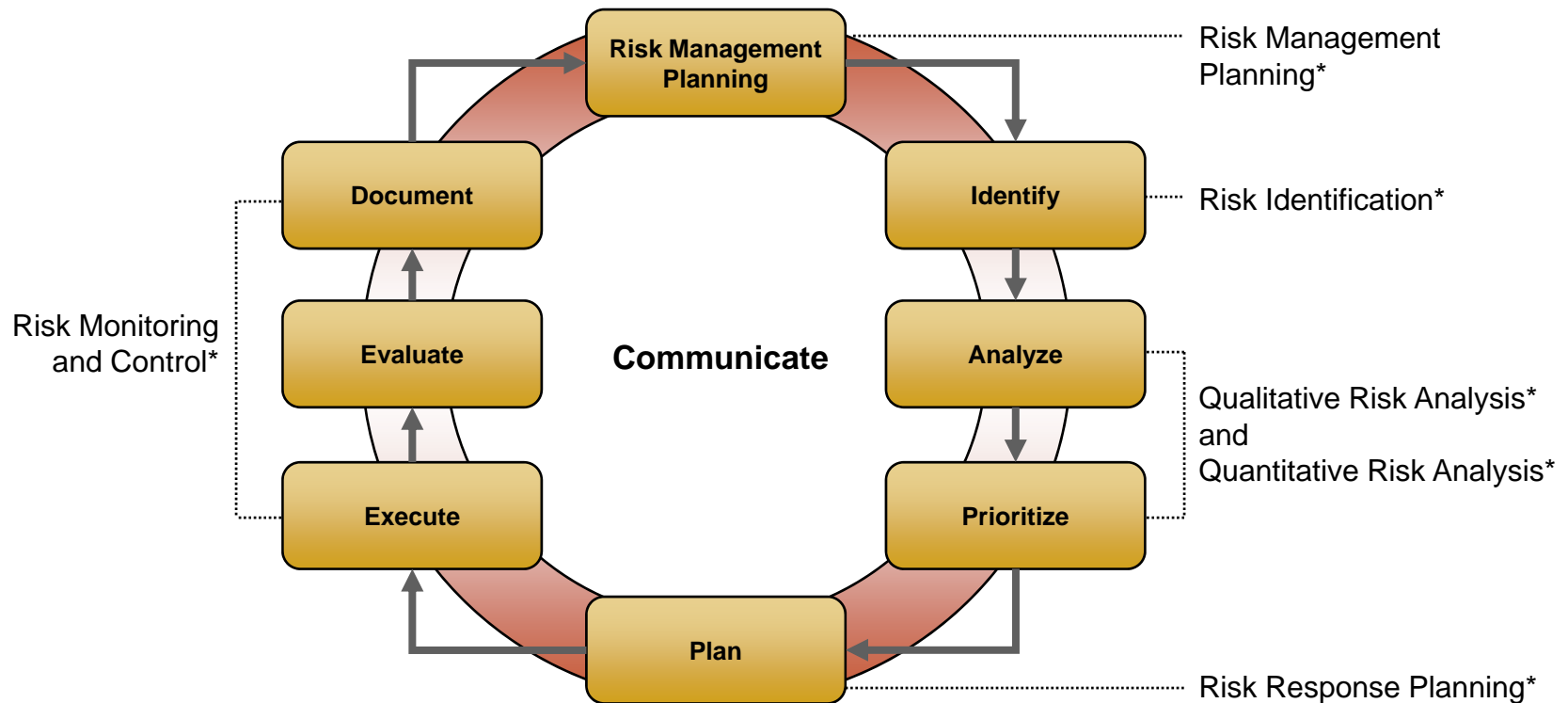 - **Quality of the estimate leads to quality of the project**

Critical Path

- Path on which any delay in project activities will impact project schedule
- Longest of all paths through the project
- Path with the least float or slack time
- Shortest time to complete the project

| Start | | 1.1.1 3 | | 1.1.2 4 | | 1.2.2 9 | | Finish |

```
Start ──→ 1.1.1 (3) ──→ 1.1.2 (4) ──→ 1.2.2 (9) ──────────────→ Finish
      └──→ 1.2.1 (6) ──────────────→ 1.3.1 (4) ──→ 1.3.2 (3) ──→
```
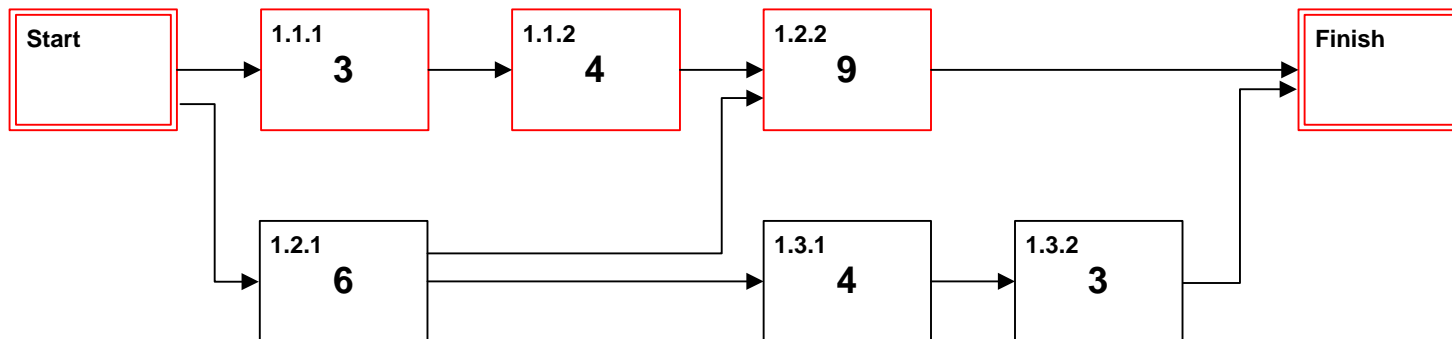
ESI's Risk Management Model

Risk Management Planning → Risk Management Planning*

Identify → Risk Identification*

Document

Evaluate

Communicate

Analyze

Prioritize → Qualitative Risk Analysis* and Quantitative Risk Analysis*

Execute

Risk Monitoring and Control*

Plan → Risk Response Planning*

*PMI® Project Risk Management Processes

building talent, **driving** results   21

Elements of a Project Plan

- Management summary
- Deliverable
- Project requirements
- WBS
- Resources
- Schedule
- Reporting and project control
- Regulation and standards
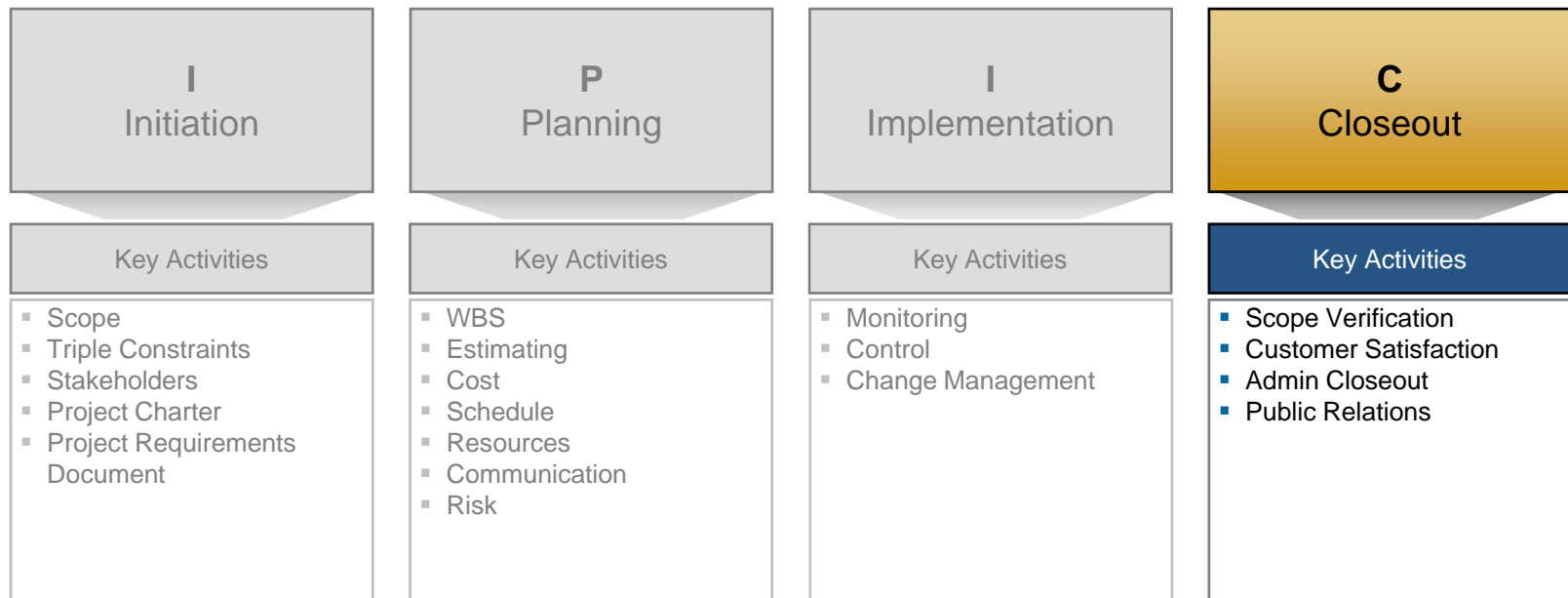- Risk Management

Project Life Cycle

I Initiation	**P** Planning	**I** Implementation	**C** Closeout
Key Activities	Key Activities	Key Activities	Key Activities
▪ Scope ▪ Triple Constraints ▪ Stakeholders ▪ Project Charter ▪ Project Requirements Document	▪ WBS ▪ Estimating ▪ Cost ▪ Schedule ▪ Resources ▪ Communication ▪ Risk	▪ Monitoring ▪ Control ▪ Change Management	▪ Scope Verification ▪ Customer Satisfaction ▪ Admin Closeout ▪ Public Relations

Project Control Considerations

- **Project control is concerned with—**
  - **Tasks**
  - **Requirements**
  - **Timing and performance**
  - **Resource utilization and outsourcing**
  - **Scope, deliverable completion, and product quality**
  - **Process improvement possibilities and lessons learned**
  - **Schedule and cost performance**

building talent, **driving** results

Change Control

- **Change comes from many sources**
  - **Customer input**
  - **Team input**
  - **Business input**
- **An organized, systematic approach is helpful in managing change**
  - **Change request forms**
  - **Review and evaluation process**
  - **Decisions by a change control board (CCB)**

building talent, **driving** results   25

Project Life Cycle

I Initiation	**P** Planning	**I** Implementation	**C** Closeout
Key Activities	Key Activities	Key Activities	Key Activities
▪ Scope ▪ Triple Constraints ▪ Stakeholders ▪ Project Charter ▪ Project Requirements Document	▪ WBS ▪ Estimating ▪ Cost ▪ Schedule ▪ Resources ▪ Communication ▪ Risk	▪ Monitoring ▪ Control ▪ Change Management	▪ Scope Verification ▪ Customer Satisfaction ▪ Admin Closeout ▪ Public Relations

Visit the "BOX"

History of Agile

In the late 1990's several methodologies began to get increasing public attention. Each had a different combination of old and new ideas, but all emphasized:

- Close collaboration between the programmer team and business experts
- Face-to-face communication (as more efficient than written documentation)
- Frequent delivery of new deployable business value
- Tight, self-organizing teams
- Ways to craft the code and the team so the inevitable requirements churn was not a crisis

History of Agile

Who?	**17 independent thinkers, competitors and anarchists from XP, Scrum, DSDM, ASD, et al**
What?	**Met to try to find common ground on software development**
When?	**February 11-13, 2001**
Where?	**The Lodge at Snowbird, Utah**
Why?	**They felt the need for an alternative to "documentation-driven, heavyweight software development processes"**
How?	**They skied, ate, drank, and came to terms, naming themselves "The Agile Alliance"**
Output?	**The Agile Software Development Manifesto**

Manifesto for Agile Software Development

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

* **Individuals and interactions** over processes and tools
* **Working software** over comprehensive documentation
* **Customer collaboration** over contract negotiation
* **Responding to change** over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.

building talent, **driving** results   30

Agile Values

1. **Individuals and interactions over processes and tools.** Teams of people build software they need to work together effectively.

2. **Working software over comprehensive documentation.** Provide benefits and value early and often. Don't get paid by the pound for your documentation; be concise.

3. **Customer collaboration over contract negotiation.** Only your customer can tell you what they want. Yes, they will change their minds and won't get it right the first time. Communicate, understand their needs, and educate your customers along the way.

4. **Responding to change over following a plan.** People change, priorities change, and the business environment changes. Technology changes over time, although not always for the better. A Project Plan is good, but stuff happens and there must be room to change it as your situation changes.

A Simple Agile Definition

Agile is an **iterative and incremental (evolutionary)** approach to software development

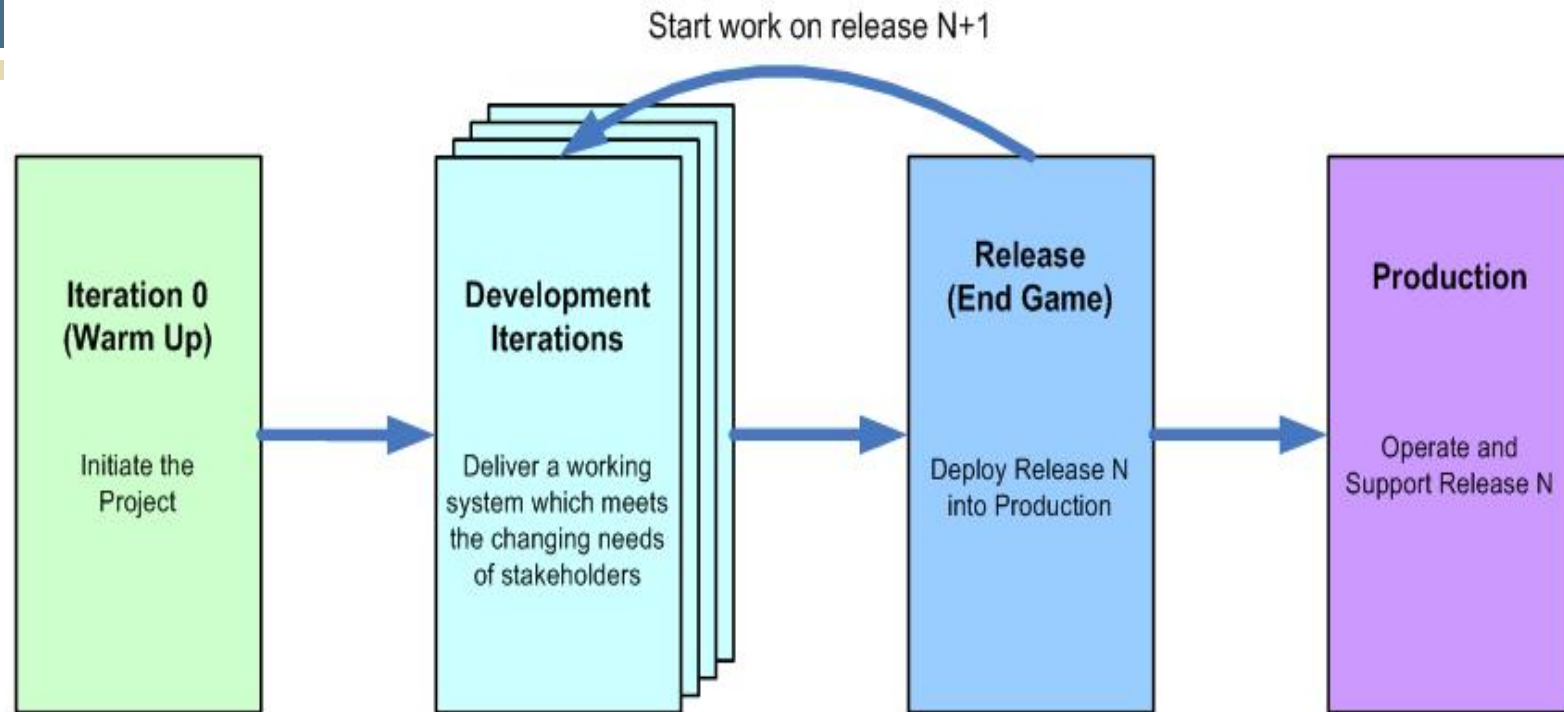performed in a **highly collaborative** manner

by **self-organizing teams**

with **"just enough process" (JEP)**

that produces **high quality software**

in a **cost effective and timely** manner

which **meets the changing needs of its stakeholders**.

Agile SDLC

Start work on release N+1

Iteration 0 (Warm Up)	Development Iterations	Release (End Game)	Production
Initiate the Project	Deliver a working system which meets the changing needs of stakeholders	Deploy Release N into Production	Operate and Support Release N

- Active stakeholder participation
- Obtain funding and support
- Start building the team
- Initial requirements envisioning
- Initial architecture envisioning
- Setup environment

- Active stakeholder participation
- Collaborative development
- Model storming
- Test driven design (TDD)
- Confirmatory testing
- Evolve documentation
- Internally deploy software

- Active stakeholder participation
- Final system testing
- Final acceptance testing
- Finalize documentation
- Pilot test the release
- Train end users
- Train production staff
- Deploy system into production

- Operate system
- Support system
- Identify defects and enhancements

Copyright 2006-2007 Scott W. Ambler

building talent, **driving** results   33

Key Features

- **Small teams, empowered to use their imaginations and experience, in conjunction with representation from the customer, to fine-tune the basic components via trial and error**
- **Coders, documenters, testers, users**

building talent, **driving** results   34

Characteristics of a 'Real Team'

- **Small size (5-10)**
- **Complementary Skills**
  - **Technical/Functional**
  - **Problem Solving and Decision Making**
  - **Interpersonal**
- **Commitment to a Common Purpose and Performance Goals**
- **Commitment to a Common Approach**
- **Commitment to Mutual Accountability**

(See <u>The Wisdom of Teams</u>, Katzenbach and Smith, Harvard University Press, 1993)
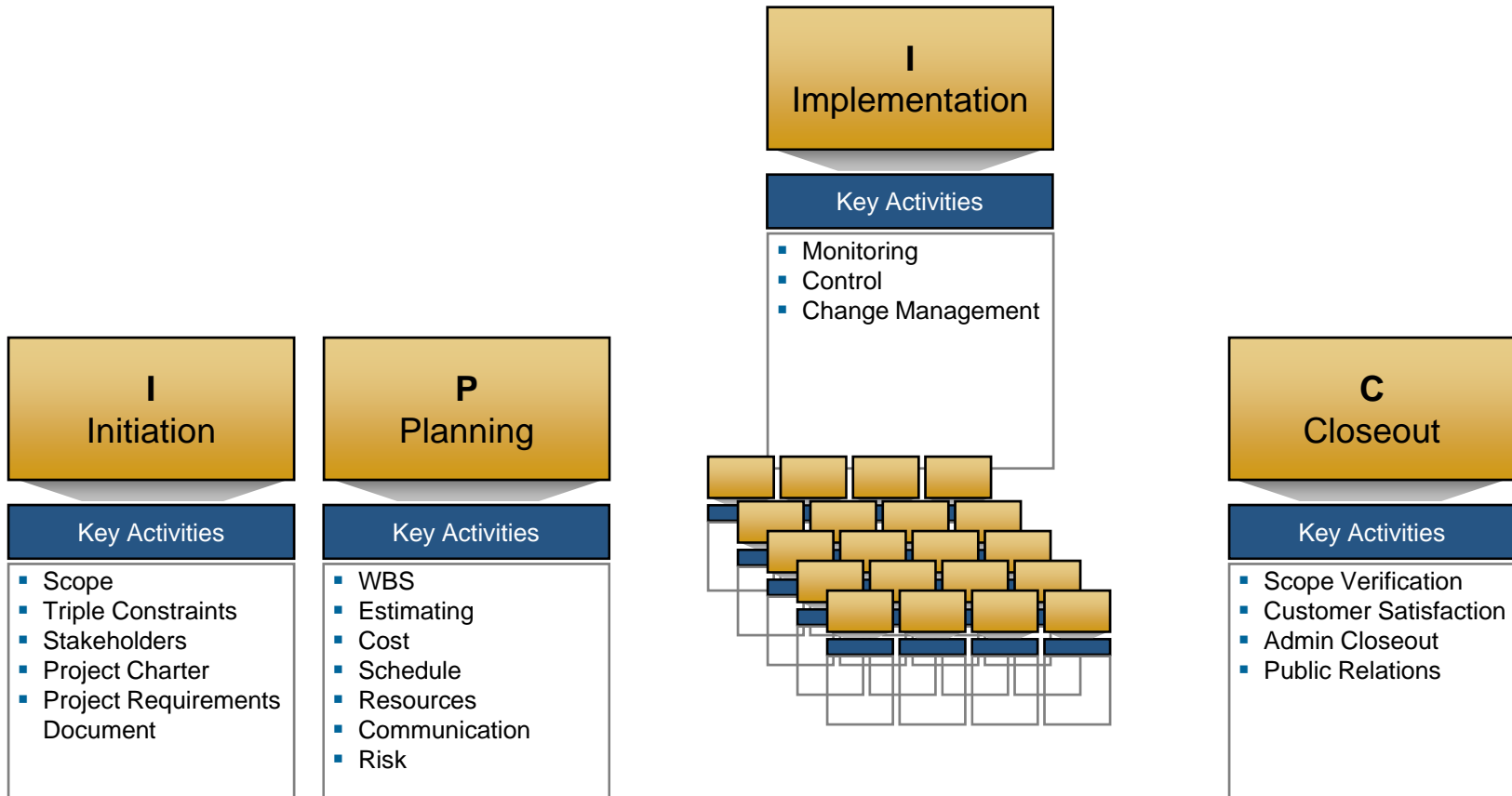
Agile Advantages

- **Speed to working versions**
- **Adaptability and flexibility**
- **Leverage of skill and imagination**

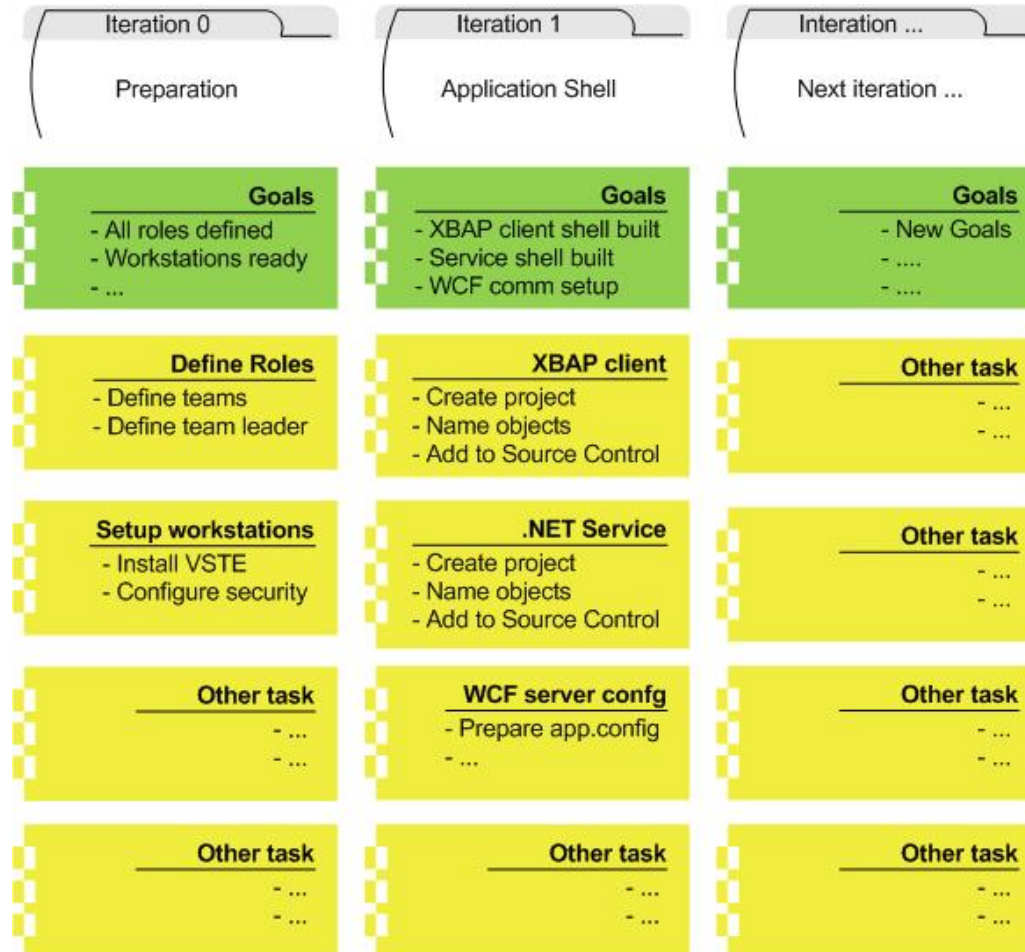**building** talent, **driving** results

Agile Disadvantages

- **May work best for small jobs and/or small components of bigger jobs**

- **Ultimate result isn't known precisely**

- **May be difficult to implement in a publicly funded, fiscally constrained context**

building talent, **driving** results   37

Management of Agile

I — Implementation

Key Activities
- Monitoring
- Control
- Change Management

I — Initiation

Key Activities
- Scope
- Triple Constraints
- Stakeholders
- Project Charter
- Project Requirements Document

P — Planning

Key Activities
- WBS
- Estimating
- Cost
- Schedule
- Resources
- Communication
- Risk

C — Closeout

Key Activities
- Scope Verification
- Customer Satisfaction
- Admin Closeout
- Public Relations

Storyboarding – the requirements

Iteration 0	Iteration 1	Interation ...
Preparation	Application Shell	Next iteration ...
Goals - All roles defined - Workstations ready - ...	**Goals** - XBAP client shell built - Service shell built - WCF comm setup	**Goals** - New Goals - .... - ....
Define Roles - Define teams - Define team leader	**XBAP client** - Create project - Name objects - Add to Source Control	**Other task** - ... - ...
Setup workstations - Install VSTE - Configure security	**.NET Service** - Create project - Name objects - Add to Source Control	**Other task** - ... - ...
Other task - ... - ...	**WCF server confg** - Prepare app.config - ...	**Other task** - ... - ...
Other task - ... - ...	**Other task** - ... - ...	**Other task** - ... - ...

Planning example

Feature	10	11	12	13	14	I5/M1
Iteration Delivery Date	1-May	1-Jun	1-Jul	1-Aug	1-Sep	30-Sep
Order Management						
Order Entry—Basic		8				
Order Entry—Advanced				6		
Order Pricing		3				
Partial Order Handling			4			
Calculate Reorders					6	
Pricing Error Handling				6		
Lead Generation						
Create Prospect Database		4				
Create Lead Message		2				
Generate Leads			8			
Call Service Center						
Establish Call Center Disks				4		
Establish Product Profiles				3		
Establish Service Entries					2	
Provide Call Routing					5	
Administrative and Security						
Security and Control					2	
User Documentation				3	4	
Contingency and Rework			3	3	3	20
Technology and Domain						
Shape Architecture	6					
Create EJB Connectors			8			
Work Effort in Days	6	17	23	25	22	20

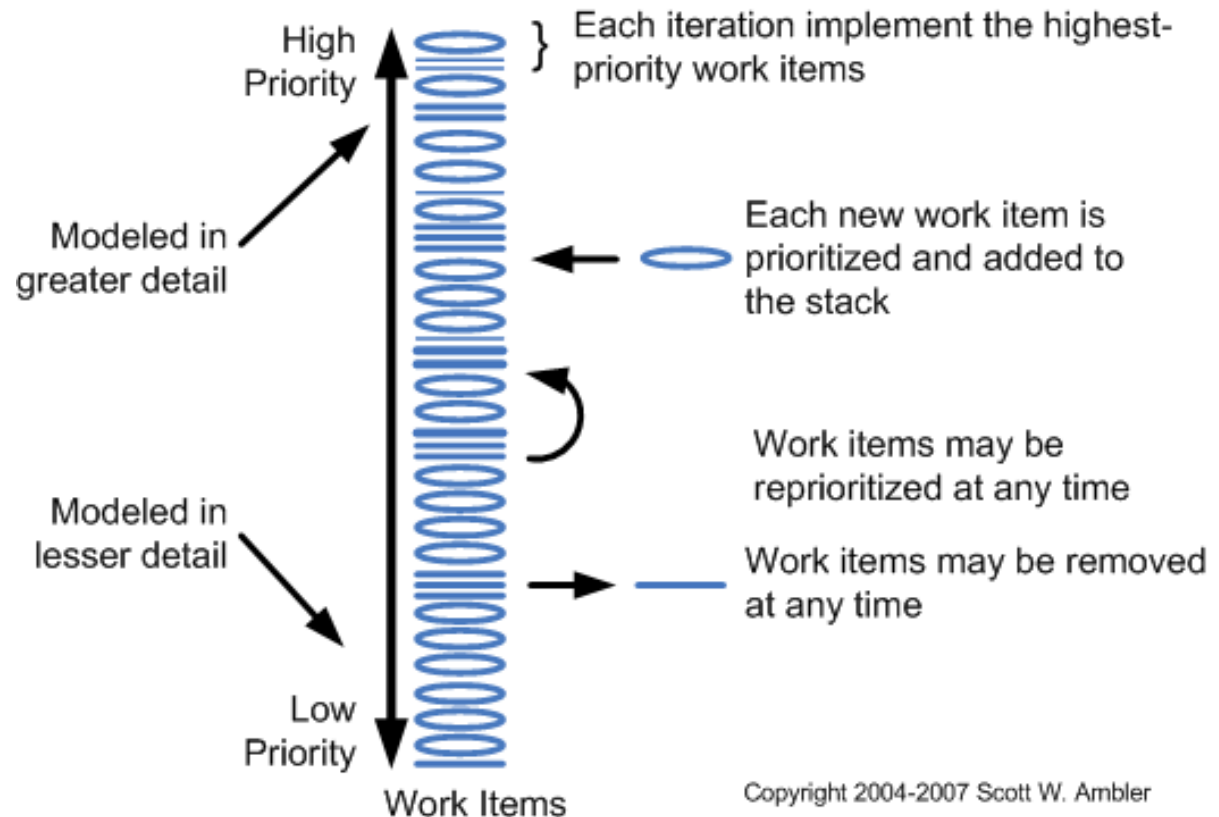**From: Agile Project Management, Jim Highsmith, Addison-Wesley, 2004**

Figure 6.4
Summary Release Plan for the CRM System (Iteration 5 is the first major milestone.)

Agile Change Management

Key CM Factors:

1. **Embrace change.**

2. Accept the idea that **requirements will evolve** throughout a project.

3. Understand that because requirements evolve over time that **any early investment in detailed documentation will be wasted**.

4. **Do just enough initial requirements envisioning** to identify project scope and develop a high-level schedule and estimate.

5. **"Model Storm"** (JIT modeling) continually during development to explore each requirement in the necessary detail.

High Priority — Each iteration implement the highest-priority work items

Modeled in greater detail

Each new work item is prioritized and added to the stack

Modeled in lesser detail

Work items may be reprioritized at any time

Work items may be removed at any time

Low Priority

Work Items

Copyright 2004-2007 Scott W. Ambler

A Huge Question

- **Remember the Boundaries, the Management Concerns - Is there any difference???**

?

What Is Project Management?

- **Project management is—**
  - **The application of knowledge, skills, tools, and techniques to project activities to meet project requirements**
  - **Achieving desired outcomes in a context of conflicting expectations and changes, using other people's resources, and having limited authority**

QUESTIONS ???

James H Foreman, PMP
843-566-2067

www.esi-intl.com